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### (54) PIEZOELECTRIC CERAMIC COMPOSITION AND ITS PRODUCTION

#### (57)Abstract:

**PROBLEM TO BE SOLVED:** To improve heat resistance and thermal shock resistance by calcining a mixture obtained by adding a specific amount of Mn<sub>3</sub>O<sub>4</sub> to a main component comprising Pb, Mn, Nb, Ti, Zr and O, and in a specified composition, milling the calcined product, adding an organic binder to the milled product, compacting the resultant materials, baking the compact, and carrying out the polarization of the baked compact.

**SOLUTION:** Mn<sub>3</sub>O<sub>4</sub> in a proportion of 0.3-0.8 wt.% as a subsidiary ingredient based on a main component in the proportion of 100 wt.% is added to and mixed with the main components of the formula Pb  $\alpha$  (Mn<sub>1/3</sub>Nb<sub>2/3</sub>)<sub>x</sub>Ti<sub>y</sub>Zr<sub>z</sub>O<sub>3</sub> (1.00  $\leq \alpha \leq$  1.05; 0.07  $\leq x \leq$  0.28; 0.42  $\leq y \leq$  0.62; 0.18  $\leq z \leq$  0.45; x+y+z=1). The obtained mixture is calcined at about 900° C, and the calcined product is milled by a ball mill. An organic binder such as a PVA is added to the milled raw material, and the resultant materials are subjected to pressure compacting to provide a prescribed shape. The obtained compact is baked in a closed furnace at about 1,150-1,290° C. The obtained sintered body is polarized by applying 2.5-3.0 kV/mm direct electric field to the sintered body at 130-180° C. As the result, the objective piezoelectric ceramic composition excellent in heat stability, and causing small change of a resonance frequency after applying a thermal shock, and before and after of temperature cycling is obtained.

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